# FISHERIES REPORT
# AND
# AQUATIC BIOLOGICAL EVALUATION

**for**

**Threatened, Endangered, and Sensitive (TES) Species**

**Sisters Ranger District**
**Deschutes National Forest**

## Melvin Butte Vegetation Management Project

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# I. SUMMARY

The following tables displays the threatened, endangered and sensitive (TES) species and their status, occurrence and effects determinations considered in the analysis of the Melvin Butte Vegetation Management Project.

| Species | Scientific Name | Status | Occur-rence | Effects Determination |
|---|---|---|---|---|
| **Aquatic Species** | | | | |
| Columbia River Bull Trout | *Salvelinus confluentus* | T | HN, N | NE |
| Bull Trout Critical Habitat | *Salvelinus confluentus* | T | HN, N | NE |
| Interior Redband Trout | *Oncorhynchus mykiss* ssp. | S | HD, D | NI |
| Indian Ford Juga | *Juga hemphilli ssp.* | S | HN, N | NI |
| A Caddisfly | *Rhyacophila chandleri* | S | HN, N | NI |

**Status**

| | |
|---|---|
| E | Federally Endangered |
| T | Federally Threatened |
| S | Sensitive species from Regional Forester's list |
| C | Candidate species under Endangered Species Act |
| MS | Magnuson-Stevens Act designated Essential Fish Habitat |

**Occurrence**

| | |
|---|---|
| HD | **Habitat Documented** or suspected within the project area or near enough to be impacted by project activities |
| HN | **Habitat Not** within the project area or affected by its activities |
| D | Species **Documented** in general vicinity of project activities |
| S | Species **Suspected** in general vicinity of project activities |
| N | Species **Not documented** and not suspected in general vicinity of project activities |

**Effects Determinations**

Threatened and Endangered Species

| | |
|---|---|
| NE | No Effect |
| NLAA | May Effect, Not Likely to Adversely Affect |
| LAA | May Effect, Likely to Adversely Affect |
| BE | Beneficial Effect |

Sensitive Species

| | |
|---|---|
| NI | No Impact |
| MIIH | May Impact Individuals or Habitat, but Will Not Likely Contribute to a Trend Towards Federal Listing or Cause a Loss of Viability to the Population or Species |
| WIFV | Will Impact Individuals or Habitat with a Consequence that the Action May Contribute to a Trend Towards Federal Listing or Cause a Loss of Viability to the Population or Species |
| BI | Beneficial Impact |

# II. INTRODUCTION

This Biological Evaluation/Assessment (BE/BA) documents the review and findings of the Forest Service planned programs and activities for possible effects on species (1) listed or proposed for listing by the USDI Fish and Wildlife Service (USFWS) as Threatened or Endangered; or (2) designated by the Pacific Northwest Regional Forester as Sensitive; or (3) required consultation with the National Marine Fisheries Service (NMFS) under the Magnuson-Stevens Fishery Conservation Act (MSA). It is prepared in compliance with the requirements of Forest Service Manual (FSM) 2630.3, FSM 2672.4, and the Endangered Species Act of 1973, as amended (ESA) (Subpart B; 402.12, Section 7 Consultation).

The following analysis addresses the potential effects of the Melvin Butte Vegetation Management Project on threatened, endangered, and sensitive fish and other aquatic species. This determination, required by the Interagency Cooperation Regulations (Federal Register, January 4, 1978), ensures compliance with the ESA. Changes to the R-6 Regional Forester's Sensitive Species List were instituted in 2011. Sensitive aquatic invertebrate species were identified in the 2011 list on the Deschutes National Forest and are covered in this report.

# III. PROJECT DESCRIPTION AND PROPOSED ACTION

The proposed action has potential treatment units identified on 4,469 acres of a 5,375 acre project boundary. Units have been delineated throughout the project boundary but not all portions of these units will be treated. A retention strategy has been created that identifies large areas within the project boundary with varying levels of retention. Within these areas a minimum of 0-20% of the landscape will be identified as retention areas to meet habitat requirements for interior wildlife and botanical species. Retention areas will be identified and removed from potential treatment to maintain landscape variation across the planning area.

A Wildland Urban Interface (WUI) strategy would be applied to lands described as wildland-urban interface in the Greater Sisters Country Community Wildfire Protection Plan, primarily along major road systems, and includes areas adjacent to private property. After treatment these areas would provide for lower fire intensity and allow for more effective and safe fire suppression.

Two areas within the project area are the focus of this strategy:

1) Reduce hazardous ladder fuels, primarily adjacent to Forest Roads 16, 1620, and 1628, from the southern boundary of the project area to the boundary of the SAFR project Fuel reduction treatments would include thinning from below, retention of residual green trees in areas of high lodgepole pine mortality, mowing of shrubs, and prescribed burning.

2) Reduce hazardous ladder fuels along the western boundary of the Cascade Timberlands property and along the eastern edge of the project area. This would help prevent fires from moving from National Forest System lands onto private property. Fuel reduction treatments would include thinning from below, mowing, and prescribed burning. Treatments would comply with the visual quality standards for the Front Country land allocation.

## Melvin Butte Alternatives and Treatment Descriptions

***Alternative 1 (No Action)***
Under this alternative no new activities would be proposed in the project area. Ongoing management activities such as fire suppression would continue as well as other public uses such as firewood cutting.

No vegetation management as proposed in Alternative 2 or 3 would occur. This alternative serves as a comparative baseline to analyze the action alternatives.

***Alternative 2 (Proposed Action)***
This is the Proposed Action as described in the public scoping document. It includes the Retention and Wildland Urban Interface strategies (described below) which are common to the action alternatives.

*Retention Strategy*
A retention strategy was designed to maintain habitat for interior forest species in the project area. The project area was divided into three categories of 10%, 15% and 20% retention based on the soil characteristics and the potential for development of multi-storied stands. These percentages prescribe the amount of the landscape that would be retained in variable sized blocks to promote stand development. Areas identified as no treatment may contribute toward the retention percentage if they provide desirable stand conditions. Activities associated with the prescribed burning treatment units may occur in retention areas if they are compatible with promoting stand development for interior forest species. This determination would be made on a stand-by-stand basis with coordination between the fuels and wildlife resource groups. Using the above criteria there would be 775 acres in the project area identified for retention.

***Alternative 2 (Proposed Action) Treatment Descriptions***

**Lodgepole Pine Improvement Area** (249 acres): *The goal is to create a mosaic of even aged stands with natural appearing openings within the lodgepole pine, while providing a fuel break adjacent to Forest Road 16.*

Improvement cutting is the removal of less desirable trees of any species in a stand of poles or larger trees, primarily to improve composition and quality. Improvement cutting activities are primarily proposed in lodgepole pine stands that were affected by the mountain pine beetle outbreak of the 2000s. The proportion of their overstories that exhibit poor crowns and/or heavily-infected mistletoe would be removed. These trees have poor growth rates and potential for infecting the understory with mistletoe is high. These stands would have fewer remaining overstory trees than in those stands that are thinned. The understory would contribute considerably to future growth. A series of patch cuts (up to five acres) would occur across the area to break up the continuity of the stands, creating a mosaic of even aged stands.

This treatment in the lodgepole pine plant association would provide a discontinuous fuel bed adjacent to Forest Road 16 in support of the Wildland Urban Interface strategy. Within the Wildland Urban Interface stands would be thinned over time to maintain a fuel break along the road.

**Plantations** (1,174 acres): *The goal is to create more structurally diverse forests*.

Plantations in the Melvin Butte area are a result of clear cutting or group selection harvest practices. Plantation treatments would include small tree thinning, pruning to remove mistletoe, mowing of shrubs, and prescribed burning. The edge of adjacent stands would be treated to remove dwarf mistletoe infestations (e.g. pruning, small tree thinning, and girdling). Planting of trees would occur in areas heavily infected with mistletoe where the majority of trees are removed. Thinning treatments would be based on variable density thinning sometimes referred to as a "gappy/patchy/clumpy" treatment.

**Ponderosa Pine infected with Dwarf Mistletoe** (160 acres): *The goal is to maintain and restore ponderosa pine stands relatively free from mistletoe and at the same time recognize that mistletoe plays a role in ecosystem function.*

These areas occur primarily in the lower elevations of the project area. Stand conditions vary greatly across this treatment area. Treatment types are based on the number of trees per acre and include:

Stands with 4-14 trees per acre that are greater than 21 inches dbh (147 acres):

- Girdle the overstory trees to meet wildlife habitat requirements; leave groups of overstory trees in clumps while removing infected overstory trees around the clumps, then harvest remaining overstory trees

**Prescribed Fire** (809 acres): *The goal is to manage in-growth of trees, reduce fuels, and reintroduce fire back into the ecosystem*.

This treatment would be applied to 1) areas that have been previously harvested and that require understory maintenance burning; 2) areas not conducive to mechanical treatment such as mowing and where fire would be used to meet stand objectives; and 3) areas where prescribed fire would be used to maintain fire climax ponderosa pine stands. This treatment allows for some small tree thinning and mowing, where appropriate, to reduce ladder fuels that reach into the crowns of old large trees and to meet fire management objectives. Fire effects would range from light to moderate burn intensities. There are 161 acres of the 933 acres (17%) of the proposed prescribed fire units that also provide retention areas. Treatment of these acres would require coordination between the wildlife and fuels resource groups to ensure that retention stands can be maintained or improved.

**Thinning** (998 acres): *The goal is to maintain fire climax ponderosa pine*.

Thinning would occur in the Ponderosa Pine and Mixed Conifer Dry plant association groups. These areas have a predominance of old growth or second growth ("black bark pine") ponderosa pine in the overstory with some small diameter ponderosa pine and white fir in the understory. In many cases, thinning would move multi-story late old structure stands to single story late old structure stands.

- Treatments within the old growth stands would include thinning from below, mowing of shrubs, and prescribed burning.

- Thinning treatments in the second growth ponderosa pine would be based on variable density thinning ("gappy/patchy/clumpy") similar to what is planned in the Glaze Forest Restoration Project located near Black Butte Ranch just northwest of Sisters, Oregon. In some cases, thinning may include the removal of some larger trees, predominantly white fir, to create uneven aged stands to provide for long term sustainability.

**Thinning with Group Openings** (839 acres): *The goal is to maintain and restore fire climax ponderosa pine*.

These treatment areas are predominately located in the mixed conifer wet plant association and are dominated by white fir. The two treatment types proposed are based on the relative absence or presence of ponderosa pine in the overstory.

1) These areas have a moderate amount of residual ponderosa pine in the overstory with young white-fir/ponderosa pine ladder fuels in the understory. Treatments would include thinning from below, mowing of shrubs, and prescribed burning.

2) These are areas where currently ponderosa pine is widely scattered, absent, or had been present in the past. Many of these areas had the overstory pine harvested with an objective of managing the white-fir understory or where pine was lost due to insects and disease.

To restore areas where pine is absent, group openings (typically 1-2 acres but can be up to 3 acres) would be created and planted to ponderosa pine. Openings would be irregular in shape to blend with the landscape. Created openings could represent up to 30% of a stand area, but are expected to be closer to 10-15%. Where there is some scattered residual ponderosa pine, small diameter trees would be thinned to protect the remaining overstory pine.

**Scenic Views Enhancement Treatment** (240 acres): The goal is to meet the direction for Scenic Views management area.

Due to stand replacement fire that occurred during the 2012 Pole Creek fire along a Scenic Views – Foreground management area adjacent to and west of Forest Road 16, scenic quality standards and guidelines are not being met. The public travels on Forest 16 to recreation sites in the area.

In order to meet the long-term goals for the Scenic Views - Foreground management area that is classified as high Scenery Integrity – SMS (Retention – VSM), green trees and scattered clusters of fire killed trees would remain in order to slowly transition the area to become scenic once again in the future. Removal of some of the dead trees (<8 inches dbh) would create a random cluster grouping and featured edge instead of a uniform shape and straight edge of trees when viewed from the road. Newly planted trees in the open areas surrounding the scattered clusters of dead trees would eventually change the appearance of this edge of forest overtime from burned to green. Logging debris would be lopped and scattered adjacent to Forest Road 16 to meet scenic quality standards and guidelines.

**Secondary Treatment**
Mastication, mowing, pile burning or underburning could potentially occur as secondary treatments.

**Transportation**
Alternative 2 proposes 0.80 mile of temporary road; about 8 miles of roads to be decommissioned; and about 6 miles of road closed.

***Alternative 3***
This alternative addresses several comments received during public scoping that did not constitute a focused alternative, but could fit into a larger alternative. This alternative includes suggestions for no temporary roads, no group openings and no removal of larger ponderosa pine trees with dwarf mistletoe.

Alternative 3 does not include temporary roads. The alternative does not include group openings in the Mixed Conifer Plant Association Group as described in Alternative 2 and converts the Ponderosa Pine Dwarf Mistletoe Treatments to the standard thinning prescription. Lodgepole pine improvement, plantation, prescribed fire, and retention areas are the same for both alternatives.

**Alternative 3 Treatment Descriptions**

**Lodgepole Pine Improvement Area** (249 acres): *The goal is to create a mosaic of even aged stands with natural appearing openings within the lodgepole pine, while providing a fuel break adjacent to the 16 Rd.*

This treatment description is the same as Alternative 2.

**Plantations** (1,174 acres): *The goal is to create more structurally diverse forests*.

This treatment description is the same as Alternative 2.

**Prescribed Fire** (809 acres): *The goal is to manage in-growth of trees, reduce fuels, and reintroduce fire back into the ecosystem*.

This treatment description is the same as Alternative 2.

**Thinning** (1,164 acres): *The goal is to maintain fire climax ponderosa pine*.

Thinning would occur in the Ponderosa Pine and Dry Mixed Conifer plant association groups. These areas have a predominance of old growth or second growth ("black bark pine") ponderosa pine in the overstory with some small diameter ponderosa pine and white fir in the understory. In many cases thinning would move multi-story late old structure stands to single story late old structure stands.

1) Treatments within the old growth stands would include thinning from below, mowing of shrubs, and prescribed burning.

2) Thinning treatments in the second growth ponderosa pine would be based on variable density thinning ("gappy/patchy/clumpy") similar to what implemented in the Glaze Forest Restoration Project located near Black Butte Ranch just northwest of Sisters, Oregon. In some cases thinning would include removal of some larger trees, predominantly white fir, to create uneven aged stands to provide for the long term sustainability.

**Thinning without Group Openings** (769 Acres)**:** *The goal is to maintain and restore fire climax ponderosa pine*.

This treatment is similar to the Thinning with Group Openings as described in Alternative 2 but does not include group openings. While 820 acres are identified for treatment the amount of effective treated acres is expected to be 10%-30% less based on the lack of group openings. The effective acres treated would range from 574 to 738 acres. Specific stand conditions would ultimately guide the effective acres treated.

In mixed conifer stands that are dominated by white fir, thinning would occur adjacent to residual overstory ponderosa pine. Treatments would include thinning from below, removing young white fir/ponderosa pine ladder fuels from around the overstory ponderosa pine, mowing of shrubs and/or prescribed burning.

**Scenic Views Enhancement Treatment** (240 acres): The goal is to meet the direction for Scenic Views management area.

Same as Alternative 2.

**Secondary Treatment**
This treatment description is the same as Alternative 2.

## Transportation

Approximately 0.80 miles of temporary road may be necessary to access stands for treatment.

Constructed temporary roads would be closed and restored after use. The proposed action also includes decommissioning about 8 miles of road and closing about 6 miles of road. With Alternatives 2 and 3 the total miles of open system roads will be reduced from about 49.2 miles to about 35.2 miles, a reduction of about 14 miles with a change of density from 5.98 miles/miles$^2$ to 4.66 miles/miles$^2$. A portion of the roads to be decommissioned are already listed as closed (See Transportation Report).

## Project Design Criteria and Best Management Practices - Aquatics

Best Management Practices (BMPs) and Project Design Criteria (PDC) were developed for the Melvin Butte Vegetation Management Project using the National Core BMP Technical Guide (USDA Forest Service 2012b) based on recommendations in the 2013 Whychus Watershed Analysis Update (USDA Forest Service 2013b), field verification, and the best available science. The BMP and PDC that provides the most protection for the hydrology resource in the Melvin Butte Project area is restricting treatment within Riparian Reserves to road closure and decommissioning. Any springs, wetlands, or ephemeral channels found during Project implementation that were not originally mapped or identified should be protected by using the Riparian Reserve and ephemeral channel buffers identified in this EA (Table 1). BMPs and PDC were discussed with operations personnel to ensure feasibility for implementation effectiveness. BMPs and PDC are discussed throughout the effects analysis of this report and are the primary mechanism to mitigate potential hydrologic effects from the project.

BMP implementation and effectiveness has been systematically monitored across National Forest Lands in California since 1992. From 2008-2010, randomized monitoring showed 91% of BMPs were implemented, and 80% of implemented BMPs were rated effective. BMPs for timber harvests, fuels treatments, and vegetation management were consistently highly effective, while BMPs for other activities, including roads, range management, recreation, and mining, were less effective (USDA Forest Service 2013a). At sites where BMPs were not implemented or effective the monitoring program includes a strong feedback loop to take corrective action on non-compliance scenarios.

At the national scale, a consistent program to monitor BMP implementation and effectiveness has been in development for several years. Monitoring of BMP implementation and effectiveness using the national BMP protocols has taken place on the Deschutes National Forest since 2011. Monitoring results from vegetation management projects indicate that BMPs intended to minimize effects to water, aquatic and riparian resources were successfully implemented, and BMPs intended to minimize effects from landings and ground-based mechanical harvest were successfully implemented, including landing location, spacing of skid trails, and retention of cover (USDA Forest Service 2011a, 2012a). Select BMPs, PDC, and project design elements are shown in Table 1.

Table 1: Select project design considerations, BMPs, and PDC for the Melvin Butte Vegetation Management Project.

| Practice | Initial Project Design Element | BMP/PDC |
|---|---|---|
| No harvest, mowing or prescribed fire in Riparian Reserves | X | X |
| Buffer hydrologically connected ephemeral draws and limit designated crossings (see specifics below) | | X |
| Buffer ditches according to Forest ditch guidance (see specifics below) | X | |

| | | |
|---|---|---|
| No new road construction | X | X |
| No temporary road construction or use in Riparian Reserves | | X |
| No haul on hydrologically connected roads or roads within riparian reserves when conditions are wet and can cause sedimentation to reach Three Creek (see specifics below) | | X |
| No haul across stream fords when streams are flowing | | X |
| Drainage improvement on unstable hydrologically connected roads before haul can occur and regular preventative maintenance (see specifics below) | | X |
| Closure of 6.2 miles of road upon project completion | X | |
| Planned decommissioning of 6.4 miles of road. | X | |
| Decommission all temporary roads | | X |
| Installation of waterbars on skid trails where needed | | X |
| Construction of new landings and skid trails would be minimized | | X |
| No ground-based harvest on slopes over 30% | X | |

Initial project design elements were included in the development of the Proposed Action. BMPs were developed using recommendations in the National Core BMP Technical Guide (USDA Forest Service 2012b), and site-specific analysis of the project area

## Project Specific Design Criteria

Ephemeral Channels -

- The intent of this design element is to protect the integrity of the channel banks, provide for wood recruitment, reduce sedimentation, and dissipate stream energy.
- Mechanical treatment, including mowing, is not allowed within 30 ft. of ephemeral channels, unless approval is granted by a hydrologist or fish biologist to allow some treatment in low risk areas. Underburning is allowed.
- Hand-thinning or minimal reaching in with equipment is permitted but cutting any trees within the channel or on the banks is not allowed.
- Allow crossings of channel at designated areas during dry season or unless approval is granted by a hydrologist or fish biologist
- Do not locate slash or burn piles in swales, washes, or depressions.

Ditches

- The intent of this design element is to protect the integrity of the ditch and protect stream water quality.
- Ditches and channelized streams that are functioning as a stream should be buffered based on the class of stream for which they are functioning (i.e. Class 4 buffer if the ditch is intermittent, etc.).
- Ditches that do not connect back to a stream (i.e. they feed out into a pasture or irrigation device) should be buffered 30 ft. to protect the integrity of the channel. No mechanized equipment is

allowed within the buffer. Hand-thinning or reaching in with equipment is permitted but do not cut any trees within the channel or on the banks. Do not fell or yard any trees across the channel in order to protect channel integrity.

- Abandoned ditches with no active water rights to use the water in the future do not need a buffer.

Haul Roads

- The intent of this design element is to reduce sedimentation to Three Creek caused from hauling.
- Roads that may need maintenance or that should be monitored for excessive wetness in hydrologically connected areas are (other roads may be identified in the field):
    - 1620-377 – adjacent to ephemeral draw, decommission after use;
    - 1620-570 – adjacent to ephemeral draw, close after use;
    - 1620-880 – adjacent to ephemeral draw;
    - 1624-360 – adjacent to ephemeral draw, decommissioning after use.

# IV. MANAGMENT DIRECTION

A number of Forest planning documents and assessments guide the development of the purpose and need and the proposed action. All federal land management activities in the Melvin Butte Vegetation Management Project area must follow standards and guidelines listed in the 1990 Deschutes National Forest Land and Resource Management Plan (USDA Forest Service 1990), as amended by the Northwest Forest Plan (NWFP) (USDA Forest Service and USDI Bureau of Land Management 1994), and in accordance with Best Management Practices (WT-5; USDA Forest Service 1998a) and the Clean Water Act (WT-1). All National Forest lands in the Melvin Butte Vegetation Management Project area fall under the guidance of the NWFP. Additional guidance is provided by the Whychus Watershed Analysis (USDA Forest Service 1998b), the Whychus Late Successional Reserve Assessment (USDA Forest Service 2001), and the Whychus Watershed Analysis Update (USDA Forest Service 2013b, Press 2009, Dachtler 2009). In addition, the Greater Sisters Country Community Wildfire Protection Plan was consulted in developing the proposed action.

## Deschutes National Forest Land and Resource Management Plan

The following standards and guidelines from the Deschutes Land and Resource Management Plan are applicable to the project:

RP-3. Give preference to riparian area dependent resources.
RP- 8. Evaluate the cumulative effects of proposed projects on water quality, runoff, stream channel conditions and fish habitat and adopt measures to avoid adverse effects to these resources.
RP- 10. Manage woody debris and riparian vegetation to: 1) maintain or enhance stream channel and bank structure, and, 2) provide structural fish habitat to meet the objective for resident fish populations provided for in the Forest Plan.
RP-39. Large organic material which is beneficial to fish, wildlife or water quality will be preserved in riparian areas, stream or river channels and lakes adjacent to summer homes. Streambank erosion or esthetic enhancements are not adequate reasons for its removal. The material may be altered if it creates a safety hazard, however its contribution to the riparian resources will be preserved.

## Northwest Forest Plan

The Deschutes National Forest LRMP was amended in 1994 by the Record of Decision for Amendments to the Forest Service and Bureau of Land Management Planning Documents within the Range of the

Northern Spotted Owl (Northwest Forest Plan) (USDA Forest Service and USDI Bureau of Land Management 1994).

The entire Melvin Butte project area is managed under the direction of the Northwest Forest Plan. The Riparian Reserve land allocation was established as a key element of the Aquatic Conservation Strategy where riparian-dependent resources receive primary emphasis. The Matrix land allocation consists of lands outside other designated areas; it was intended in the Northwest Forest Plan that most timber harvest and other silvicultural activities would occur in the Matrix areas that have suitable forest lands.

The action alternatives meet all the applicable standards and guidelines in the Deschutes National Forest LRMP (USDA Forest Service 1990) (LRMP) as amended by the Record of Decision for Amendments to the Forest Service and Bureau of Land Management Planning Documents within the Range of the Northern Spotted Owl (Northwest Forest Plan (USDA Forest Service and USDI Bureau of Land Management 1994). All riparian areas within the project area are located within the Northwest Forest Plan Area. No acres in Riparian Reserves would be treated under any of the Action Alternatives.

The Melvin Butte Vegetation Management Project complies with the following four requirements for projects within Riparian Reserves as directed in the ROD (USDA Forest Service and USDI Bureau of Land Management 1994): "1) review projects against the ACS objectives at the project or site scale, rather than only at the watershed scale, 2) evaluate the immediate (short-term) impacts, as well as long-term impacts of an action, 3) provide a description of the existing condition, including the importation physical and biological components of the 5$^{th}$ field watershed; and 4) provide written evidence that the decision maker considered relevant findings of watershed analysis" (USDA Forest Service and USDI Bureau of Land Management 2007). There are no activities associated with the Melvin Butte Vegetation Management Project that are planned within Riparian Reserves. The Melvin Butte Vegetation Management Project meets the four requirements by: 1) providing an analysis of the ACS objectives in the Environmental Assessment, 2) discussing the effect of the proposed Melvin Butte Vegetation Management Project and other past, present and future foreseeable projects on the existing condition in the hydrology report, 3) referencing the Sisters/Whychus Watershed Analysis (USDA Forest Service 1998b), and the Whychus Watershed Analysis Update (USDA Forest Service 2013b) which describe the existing condition for the portion of Whychus watershed on the Sisters Ranger District.

The NWFP provides standards and guidelines for Key Watersheds and Riparian Reserves (RRs) that prohibit or regulate activities that retard or prevent attainment of the Aquatic Conservation Strategy (ACS) Objectives at the project-level and watershed scale. Key watersheds under the NWFP contribute directly to the conservation of the threatened bull trout and resident fish populations. They also have the highest priority for watershed restoration and watershed analysis is required to set priorities for restoration. Tier 1 Key watersheds under the NWFP contribute directly to the conservation of the threatened bull trout, anadromous fish populations and resident fish populations. Tier 2 Key Watersheds may not contain at risk fish stocks but are important sources of high quality water.

Currently only the Three Creek and Headwaters Whychus Subwatersheds are considered Tier 2 Key Watersheds. Three Creek subwatershed was designated a Tier 2 Key Watershed for the long-toed salamander population that lives in the pond off the 1600-370 road and other unique amphibian habitats in the Three Creek drainage. The Melvin Butte Project is within portions of that Tier 2 Key Watershed and also within areas that are not designated as Key Watersheds.

## Northwest Forest Plan Standards and Guidelines

The NWFP (USDA Forest Service and USDI Bureau of Land Management 1994) provides standards and guidelines for Timber Management, Roads Management, Fire Fuels Management, Key Watersheds and

Riparian Reserves (RRs) that prohibit or regulate activities that retard or prevent attainment of the Aquatic Conservation Strategy (ACS) Objectives at the watershed scale (see below). All proposed actions in the Melvin Butte Vegetation Management Project comply with the Key Watershed and Riparian Reserve standards and guidelines in the NWFP. The following NWFP standards and guidelines apply to the project:

## Key Watersheds and Roadless Areas

- Inside Roadless Areas - No new roads will be built in remaining unroaded portions of inventoried (RARE II) roadless areas.
- Outside Roadless Areas - Reduce existing system and non-system road mileage. If funding is insufficient to implement reductions, there will be no net increase in the amount of roads in Key Watersheds.
- Key Watersheds are highest priority for watershed restoration.
- Watershed analysis is required prior to management activities, except minor activities such as those Categorically Excluded under NEPA (and not including timber harvest). Watershed analysis is required prior to timber harvest.

Standards and Guidelines

Roads Management:
RF-1. Federal, state, and county agencies should cooperate to achieve consistency in road design, operation, and maintenance necessary to attain Aquatic Conservation Strategy objectives.

RF-2. For each existing or planned road, meet Aquatic Conservation Strategy objectives by:

a. minimizing road and landing locations in Riparian Reserves.

b. completing watershed analyses (including appropriate geotechnical analyses) prior to construction of new roads or landings in Riparian Reserves.

c. preparing road design criteria, elements, and standards that govern construction and reconstruction.

d. preparing operation and maintenance criteria that govern road operation, maintenance, and management.

e. minimizing disruption of natural hydrologic flow paths, including diversion of streamflow and interception of surface and subsurface flow.

f. restricting sidecasting as necessary to prevent the introduction of sediment to streams.

g. avoiding wetlands entirely when constructing new roads.

RF-5. Minimize sediment delivery to streams from roads. Outsloping of the roadway surface is preferred, except in cases where outsloping would increase sediment delivery to streams or where outsloping is unfeasible or unsafe. Route road drainage away from potentially unstable channels, fills, and hillslopes.

RF-7. Develop and implement a Road Management Plan or a Transportation Management

Plan that will meet the Aquatic Conservation Strategy objectives. As a minimum, this plan shall include provisions for the following activities:

a. inspections and maintenance during storm events.

b. inspections and maintenance after storm events.

c. road operation and maintenance, giving high priority to identifying and correcting road drainage problems that contribute to degrading riparian resources.

d. traffic regulation during wet periods to prevent damage to riparian resources.

e. establish the purpose of each road by developing the Road Management Objective.

Fire/Fuels Management:
FM-1. Design fuel treatment and fire suppression strategies, practices, and activities to meet Aquatic Conservation Strategy objectives, and to minimize disturbance of riparian ground cover and vegetation. Strategies should recognize the role of fire in ecosystem function and identify those instances where fire suppression or fuels management activities could be damaging to long-term ecosystem function.

FM-4. Design prescribed burn projects and prescriptions to contribute to attainment of Aquatic Conservation Strategy objectives.

FM-5. Immediately establish an emergency team to develop a rehabilitation treatment plan needed to attain Aquatic Conservation Strategy objectives whenever Riparian Reserves are significantly damaged by wildfire or a prescribed fire burning outside prescribed parameters.

Watershed and Habitat Restoration:

WR-2. Cooperate with federal, state, local, and tribal agencies, and private landowners to develop watershed-based Coordinated Resource Management Plans or other cooperative agreements to meet Aquatic Conservation Strategy objectives.

## Whychus Watershed Analysis

The Whychus Watershed Analysis and the update include portions of the Deep Canyon Watershed that includes Three Creek and the Melvin Butte Vegetation Management Project area. Recommendations from the Whychus Watershed Analysis and update (USDA Forest Service1998, 2013b) that relate to Riparian Reserves and apply to this project are as follows:

- Restore Forest Habitats through Vegetation Management (page 227).
- Aggressively thin plantations to accelerate large tree development, especially next to Riparian Reserves.
- Promote large tree character in ponderosa pine, mixed conifer dry and wet areas along Riparian Reserves to enhance connectivity.
- Protect springs in the Three Creeks (formerly Melvin) subwatershed from vehicle and foot traffic.

## Riparian Reserve Buffer Distances

The Sisters/Whychus Watershed Analysis refined Riparian Reserve widths under the Northwest Forest Plan (NWFP) based on average maximum tree height, 100 year floodplain, extent of riparian vegetation, and unstable and potentially unstable lands (USDA Forest Service 1998b) (Table 2). These distances meet those as defined by the NWFP. Ephemeral channels or draws are not defined and do not have established buffers under the NWFP.

Table 2. Riparian Reserve (RR) widths in the Melvin Butte Vegetation Management Project area.

| ***Category*** | ***Stream Class*** | ***Description*** | ***RR width (slope distance (ft) from edge of channel)*** |
|---|---|---|---|
| 1 | 1 & 2 | Fish-bearing streams | 300 ft |
| 2 | 3 | Permanently flowing non-fish-bearing streams | 150 ft |
| 3 | NA | Ponds, lakes, reservoirs, and wetlands > 1 ac | 150 ft |
| 4 | 4 | Seasonally flowing or intermittent streams, wetlands < 1 ac, unstable or potentially unstable areas | 150 ft |

Site specific assessments should be applied by qualified personnel when delineating Riparian Reserves on the ground. As a minimum include these factors:

- Floodplains- In most cases narrow areas along stream margins and wetlands. However several locations within the watershed have broad floodplains and an intricate network of floodprone channels.
- Riparian vegetation- Connect wet meadows to nearby streams where not directly connected. Examples include Three Creek meadow.
- Stream terraces, benches, and the inner gorge- Should be included to the outer edge with adequate protection for the slopes leading to the waterbody.
- Unstable land- The majority of the area is not prone to slope failures. Areas with highly or moderately erodible soils will not be treated under the action alternatives (see Soils report). Also areas over 30% slope with seeps, example: near Rd 1514 on Whychus Creek, cinder slopes near Snow Creek, and Three Creek.
- Saturated soil and seeps- Provides areas for wetland vegetation to grow and serve as wildlife and amphibian habitat. Several riparian meadows exist in Upper Whychus Creek and Three Creek. Several of the meadows are of a fen peat nature and have unique wetland plant species (see Melvin Butte botany report)
- Rock outcrops- included because of their importance for amphibians and other species.
- Create Riparian Reserve complexes- Where Riparian Reserve boundaries are very close or overlapping consolidate into one large reserve. Consolidate complexes of meadows, intermittent streams, seeps, wetlands, ponds, rock outcrops, and other unique or special habitats.

# V. EXISTING CONDITIONS FOR AQUATICS

Within the project area, Three Creek and Three Creek Lake were historically fishless and now contain non-native brook trout and hatchery rainbow trout. Over two miles outside of the project area Whychus Creek has native redband trout, and chinook salmon and steelhead have recently been reintroduced up to the Three Sisters Irrigation District (TSID) diversion dam. There is no surface flow connection from the project area to Whychus Creek. Redband trout are on the USFS Region 6 sensitive species list. Steelhead and chinook populations being reintroduced are considered experimental populations.

Bull trout and bull trout critical habitat are documented over 27 miles away in the lower 5 miles of Whychus Creek and no historical records exist of them farther upstream. It is possible some bull trout use once existed above Sisters but runs may have been lost during the early 1900's when major water diversions began to occur. The following sections describe general hydrology, flow regimes and current and historical fish populations for all major streams within and downstream of the project area.

## Three Creek

Three Creek originates from Three Creeks Lake which has a small earthen dam built in the early 1900's to increase water storage. Three Creek Lake, Three Creek and Little Three Creek Lake were originally fishless with no surface connection to other waterbodies. Three Creek disappears and goes subsurface before reaching highway 20 near Plainview. Three Creek was historically almost entirely diverted for agricultural purposes approximately 3.8 miles downstream from the lake. Three Creek Lake receives additional flow via a ditch from Little Three Creek Lake. The channel from Little Three Creek Lake historically went back into Three Creek near the 16 road crossing but was diverted to Three Creek Lake for additional water storage. Three Creek goes dry on certain years even with additional storage provided by ditches that come from Little Three Creek Lake. Another ditch once carried water from Snow Creek to Three Creek Lake but this ditch has not been used for some time. Irrigation diversions and water rights from Three Creek appear to be no longer used. Restoration opportunities may exist for restoring flow to wetlands and streams that once flowed from Little Three Creeks Lake. The Three Creek Lake dam has been determined to be unstable and is no longer used to store water.

Habitat surveys were performed on Three Creek during 1992 and 2007. Data presented in this report is primarily from the 2007 habitat survey and reaches are displayed in Figure 1. Stocking of rainbow trout and brook trout began in the early 1900's. A self-sustaining population of brook trout exists and most likely spawns wherever they can find suitable areas, which may include a few small tributaries and the shoreline. Brook trout have been observed spawning in Three Creek below the Lake and in the ditch that comes over from Little Three Creek Lake. Large numbers of catchable hatchery rainbow trout are still stocked on a yearly basis in Three Creek Lake.

Some small springs fed streams enter Three Creek Lake but most flow comes from snow melt in the spring. A lush riparian meadow with willows and sedges is located from the dam down to the 16 road. This section of stream is highly sinuous, has several side channels and some deeper pools with undercut banks. A flow of 1.4 cfs was recorded during the 2007 stream survey. Most of the streams brook trout population is located in this section of stream. Downstream of the 16 road the stream is more entrenched, higher gradient and has fewer pools. Several small waterfalls and cascade sections are also located in this area.

## Other Unnamed Perennial and Intermittent Streams

One intermittent stream and several small spring fed streams occur within the project area that drains into Three Creek. Another intermittent stream flows out of the project area with no surface connection to waterbodies. This goes subsurface and disappears before reaching highway 20 near Plainview. There may be additional springs, perennial streams and intermittent streams that are not mapped within the project area. If these are discovered during the course of the project fisheries or hydrology specialists will evaluate them and determine appropriate protections for these areas.

Ephemeral channels are not defined under the Northwest Forest Plan. For this project ephemeral channels are defined as those that run water on occasion but do not run water on an annual basis during years with normal or average amounts of precipitation. Typically ephemeral channels lack evidence of scour for most of their length.

## Water Temperature

Water temperature is a fundamental parameter affecting a waterbodies ecology (Minshall 1978, Vannote et al. 1980). As a stream moves from headwaters to mouth exposure to solar radiation increases and water warms to near the ambient air temperature (Bartholow 1989). Water temperature is used as a stimulus to salmonid migration, spawning and habitat selectivity.

Land management activities can significantly affect water temperature. Vegetation manipulation by overstory removal can affect the shade cover and the amount of solar radiation input into the water surface. The water table can be altered by allowing encroachment of upland vegetation into the riparian zone. Creating large openings within the riparian zone canopy along streams can lead to increased water temperatures.

Water temperatures in Three Creek vary depending on flow and time of year. Water temperatures are elevated because surface water from the lakes is the primary water sources during the summer months. Water temperatures in Three Creek during the 2007 stream inventory ranged from 9 $^{o}$C to 20 $^{o}$C using a hand held thermometer, with highest temperatures in August.

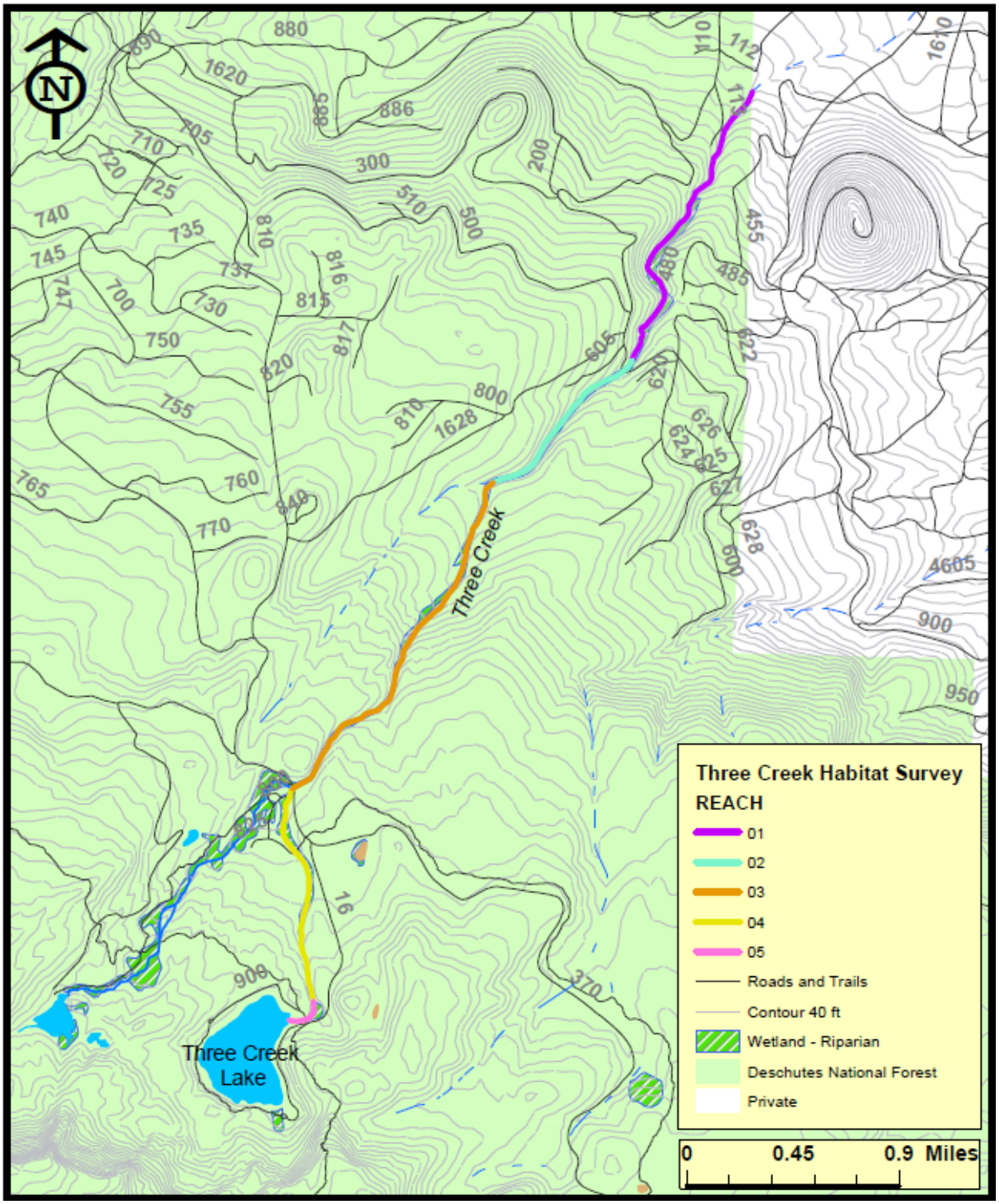

Figure 1. Stream habitat survey reaches for Three Creek in 2007.

## Streambed Embeddedness

High embeddedness can restrict winter rearing habitat for juvenile trout and salmon by filling in spaces between rocks in the streambed that could be used as cover for fish. Also, macroinvertebrates use the gravel for hiding and feeding and the more fine sediment the less habitat for macroinvertebrates.

Streams in the project area have not been sampled for embeddedness but during older stream surveys (previous to 1995) embeddedness was estimated as a yes or no if more than 35 % of the cobble or gravel substrate in a habitat unit was embedded with fine sediments. More recent stream surveys (post 1995) used pebble counts in riffles to sample surface substrate at two riffles approximately 1/3 and 2/3 through each reach. The pebble counts were done within the bankfull channel which often reflects more fine sediments than what are on the bottom of the wetted channel. This is because stream banks are often made up of mostly finer silt and sand sized particles. High embeddedness can restrict winter rearing habitat for juvenile trout and salmon by filling in spaces between rocks in the streambed that could be used as cover for fish. Also, macroinvertebrates use the gravel for hiding and feeding and in general, the more fine sediment the fewer habitats there is for macroinvertebrates.

Three Creek was not measured for embeddedness during the 2007 or 1992 stream inventories. Pebble counts performed in 2007 within the bankfull channel of riffle habitats found the highest amounts (23-31 %) of fine sediments (<2mm) in the upper half of reach 2 and reach 3. However, the other 8 pebble counts found amounts of fine sediments less than 20 % and this indicates that substrate embeddedness would be unlikely for Three Creek.

## Large Wood

Large wood is an important habitat feature for bull trout, chinook salmon and other salmonids. Wood also has a great impact on channel morphology and hydrologic stability (Abbe and Montgomery 1996) and is important for pool formation and pool volume. Wood can also influence the contribution and retention of organic matter and sediment (Fausch and Northcote 1992; Angermeier and Karr 1984; Beechie and Sibely 1997). The importance of these functions enhances fish and invertebrate biomass and production (Dudley and Anderson1982; Bilby and Ward 1989; Fausch and Northcote 1992). Large wood is used as cover for all stages of fish and promotes a more complex environment that produces increased fisheries biomass (Fausch and Northcote 1992; Bisson et al. 1988) and greatly increases the resiliency and resistance of fish species to floods and droughts (Pearsons et al. 1992).

The primary wood recruitment zone for streams which gain most of their wood from tree mortality is within 100ft slope distance from the stream bank (Benda et al. 2002). Benda and others studied wood recruitment rates for streams based on dominant process (i.e. tree mortality, bank erosion or landslide). On a coastal stream in an old growth forest in Northern California, the primary source of wood was found to be bank erosion and mortality. Over 90% of the wood entered the channel from within 30 m slope distance of the stream edge. In the Three Creek subwatershed, the trees are much shorter and bank erosion is not active in many locations. Wood recruitment prediction for streams in which 100% of the wood is recruited to the channel in less than 100ft (Benda et al. 2002).

Pieces of medium and large sized woody debris per mile in Three Creek were high only in reach 1 and 4 and this is most likely due to larger ponderosa pine and spruce in reach 1 and larger spruce and white fire in reach 4 (Table 3). Reaches 2 and 3 were dominated by lodgepole pine and white fir. Lodgepole pine seldom grows to large or medium sizes. Reach 3 was noted as having a lot of blow down that was not countable because it was located across and above the bankfull channel. Reach 5 is in a wetland meadow and only a few lodgepole pine trees are available for recruitment. Management activities in this area have not significantly altered amounts of available wood for the stream. Amounts of small sized woody debris were moderate in all reaches except for reach 5 which had none due to the wet meadow.

Table 3. Three Creek large wood attributes from the 2007 stream inventory.

| STREAM | REACH | Pieces of Med. and Large LWD Per Mile | Pieces of Small LWD Per Mile | Frequency of Med. and Large LWD | Frequency of Small LWD |
|---|---|---|---|---|---|
| Three Creek | 1 | 51.7 | 47.7 | 0.083 | 0.077 |
| | 2 | 2.2 | 31.1 | 0.006 | 0.084 |
| | 3 | 1.1 | 28.8 | 0.002 | 0.049 |
| | 4 | 31.5 | 12.6 | 0.033 | 0.013 |
| | 5 | 5.9 | 0.0 | 0.005 | 0.000 |

## Pool Frequency/ Pool Quality

Pools provide rearing areas for both juvenile and adult fish. Spawning often occurs in the tail-outs of pools. Pool frequency is based on average bankfull width and not adjusted for channel type and local conditions. Pools per mile are also a good measure of pool habitat but do not take into account stream size as pool frequency does. In general larger streams have larger and deeper pools which account for fewer pools in a given mile of stream while small streams generally have more numerous smaller and shallower pools for a given mile of stream. Stream gradient, geology, and instream wood can all have a large effect on the formation and quality of pools. Pool quality for fish is described as large pools with greater than 3 ft. in depth and pools with abundant large wood.

Pools in Three Creek were generally shallow and only reach 3 had any pools over three feet deep (Table 4). This is most likely due to the small size of the stream which was 1.4 cfs (cubic feet per second) during the stream inventory.

Table 4. Three Creek pool habitat attributes from the 2007 stream inventory.

| STREAM | REACH | Pools Per Mile | Pool Residual Depth (feet) | Pools >3ft Deep Per Mile | # of Pools Frequency |
|---|---|---|---|---|---|
| Three Creek | 1 | 71.8 | 1.0 | 0.0 | 0.116 |
| | 2 | 32.2 | 1.1 | 0.0 | 0.086 |
| | 3 | 24.5 | 1.1 | 0.5 | 0.042 |
| | 4 | 28.8 | 0.8 | 0.0 | 0.030 |
| | 5 | 17.7 | 0.6 | 0.0 | 0.016 |

## Off-Channel Habitat

Backwaters and side channels provide important habitat for juvenile redband trout, steelhead and other salmonids in spawning tributaries. Streams with stable flow regimes provide alcove and backwater areas during all seasons. Natural recruitment of trees into unconfined stream sections will increase side channels. Log jams and the flooded areas that result can create side channels and provide important salmonid rearing habitat. Off channel habitat is also created during high flow events in the floodplain. Side channels were the only form of off-channel habitat inventoried through stream surveys.

Side channels were found in reaches 1, 3 and 4 of Three Creek during the 2007 stream inventory. Side channels accounted for 1.7 %, 2.0 % and 0.9 % of the habitat area in these three reaches, respectively. In reaches 1-3 side channel formation is restricted by a narrow flood plain and valley bottom.

## Spawning Gravel Quality

Aquatic habitat is developed and persists around varieties of and scales of disturbances (Swanston 1991). These watershed disturbances recruit and remove a variety of material within the channel acting as resetting and recycling mechanisms. Fine sediment production is one type of respondent of watershed or channel disturbance such as wildfire (Beaty 1994; Minshall et. al 1997; Benda et al 2003; Wondzell and King 2003) floods (Houslet and Riehle 1998) and clear cutting (Hall and Lantz 1969). The amounts of fine sediments in spawning areas can affect the survival of salmonid eggs and alevins during incubation in redds.

Pebble counts in Three Creeks performed in 2007 within the bankfull channel of riffle habitats found the highest amounts (23-31 %) of fine sediments (<2mm) in the upper half of reach 2 and reach 3. However, the other 8 pebble counts found amounts of fine sediments less than 20 %. Amounts of gravel from pebble count data in all reaches ranged from 43 % to 77 % of the streambed substrate. Smaller sized gravel suitable for brook trout spawning exists in all reaches.

## Fish Passage

Culverts on Three Creeks under the 1600-800 road 1600-900 roads are fish passage barriers under certain condition. The dam on Three Creeks Lake is a full time upstream barrier. Natural fish passage barriers also exist at several small falls and chutes in reaches 1-3 of Three Creek. The largest falls is located in reach 3 and is 15 to 20 feet tall.

## Refugia

Refugia as it relates to fish are areas that provide high quality habitat or excellent water quality and often provide an area where fish can escape poor habitat or water quality conditions for part of the year. At a larger scale refugia relates to watersheds that contain high quality habitat and populations of TE listed fish species. These watersheds are often designated as Key watersheds under the Northwest Forest Plan.

In Three Creek the main area of refugia is in reach 5 up near the dam which usually has water flowing all year. This is where the self-sustaining brook trout population is located. Portions or all of reaches 1-3 go dry depending on the yearly precipitation and snowpack. Access to refugia is limited to areas upstream of fish barriers located in reach 3.

## Streambank Condition and Floodplain Connectivity

Stream surveys after 1995 have measured feet of unstable stream bank located above bankfull. Floodplain connectivity is not measured with stream surveys but is the streams ability to access the floodplain and associated habitats during high flow events.

Three Creek had small amounts of instability in the lower and middle reach with none recorded in the last reach just below Three Creek Lake (Table 5).

Table 5. Percent bank instability for major fish bearing streams within and downstream of the Melvin Butte Vegetation Management Project.

| STREAM | REACH | Percent Bank Instability Above Bankfull |
|---|---|---|
| Three Creek (2007) | 1 | 3.2 % |
| | 2 | 0.7 % |
| | 3 | 2.5 % |
| | 4 | 0.4 % |
| | 5 | 0.0 % |

# VI. EFFECTS ANALYSIS

## Aquatic Species

The proposed project potential treatment would occur on 5,115 acres in the Whychus and Deep Canyon Watersheds. Only a small portion of the project is located in the Whychus Watershed and there is no surface water connection from the project to Whychus Creek. The Whychus Watershed has habitat for bull trout *Salvelinus confluentus,* a federally listed threatened species, and interior redband trout *Oncorhynchus mykiss*, which is on the Regional Forester's sensitive species list. Redband trout occur outside the project boundary and bull trout occur outside of the project area near the Whychus Creek confluence with the Deschutes River. Mid-Columbia steelhead trout (listed threatened below Pelton Round Butte Dams, were also native to Whychus Creek and reintroduction of fry below the TSID diversion dam started in 2007. A few adult returns have been confirmed in lower Whychus Creek. These species will be used to analyze the effects to aquatic fish habitats, including habitat of other native species associated with similar habitats. No native fish species exist within the project area. The Indian Ford Juga *Juga hemphilli ssp.*and A caddisfly *Rhyacophila chandleri* are listed on the 2015 Regional Foresters Sensitive species list for the Deschutes National Forest. However habitat or populations of these species are not found within the project area or within close enough proximity where they could be effected by the project activities.

## Issues and Measures – Aquatics

No treatments are proposed in the Riparian Reserve to help protect riparian structure, terrestrial and aquatic habitat, and connectivity corridors in the watershed. Fuel levels are high in most of these areas due to fire suppression and/or disease. Actions proposed outside the Riparian Reserves are primarily hand thinning, mowing, piling burning, and underburning.

The following paragraph discusses potential detrimental effects from the proposed activities, however these effects are not expected from the Melvin Butte Vegetation Management Project: Hand thinning and underburning could affect the aquatic resource if shade producing trees or trees located near channels were felled or killed. Harming these trees could affect stream temperature or channel morphology. Mowing, pile burning, and underburning could cause some detrimental soil impact, and depending on the location, this could lead to sedimentation entering a waterbody. Pile burning and underburning could alter soil properties by reducing soil nutrients necessary for reestablishing vegetation where soil burn severity is high. Hydrophobicity from burning is not a concern because soils in the project area generally do not develop a hydrophobic layer from low intensity fire and generally become more porous after a burn.

Measures used to assess changes to fish populations and their habitats will assess changes to measures 1-7 (Table 6) and the magnitude, amount, duration and timing of these effects.

Table 6. Measures used for evaluating the effects of these treatments on the aquatics resources.

| Measure Number | Parameters | Measures |
|---|---|---|
| 1 | Streamflow | Acres compacted in Riparian Reserve |
| 2 | Sedimentation | Acres of soil detrimentally impacted in Riparian Reserve |
| 3 | Stream Temperature | Number of trees felled in the primary shade zone |
| 4 | Waterbody Condition | Alteration of stream/lake and bed stability measured by changes in streamflow, sedimentation, riparian vegetation, and large wood recruitment |
| 5 | Wetland Condition | Acres compacted within the wetland; Acres of riparian vegetation converted to other species or no vegetation |
| 6 | Riparian vegetation | Trees killed along streambanks |
| 7 | Large wood recruitment | Acres of tree > 12"dbh harvested within primary wood recruitment area (100 ft. of a stream) |
| 8 | Fish populations | Distance to fish populations from project activities and hydrologic connections from those areas. |
| 9 | Fish habitat | Changes to instream habitat or riparian habitat that is in close enough in proximity to influence instream habitat. Parameters 1-7 would be used to determine these changes |

## General Effects for Threatened Endangered and Sensitive Species

### *Effects of Alternative 1 – No Action*

Redband trout a USFS Region 6 Sensitive Species inhabit Snow Creek and Whychus Creek approximately 2 miles outside the project area and there is no surface water connection from the project area to Whychus Creek. Three Creek in the project area contains hatchery rainbow trout or non-native brook trout and was once fishless. Steelhead have been reintroduced in Whychus Creek outside of the project area and access is currently restricted by natural and manmade barriers but this may change in the future. Bull trout have been found over 25 miles away from the project near where Alder Springs enters Whychus Creek. Under the No Action Alternative there would be no direct impacts from vegetation or fuel treatments on redband trout, bull trout, bull trout critical habitat, steelhead or other fish species, though there could be a high risk of direct and indirect impacts should a severe wildfire occur

The no action alternative would not cause any short-term impacts, however some areas could continue to contribute to long- term degradation. Without active restoration work, including inactivating/decommissioning roads, rehabilitating compacted sites, enhancing meadows and riparian areas, watershed recovery to a more "natural" condition may take many decades.

This alternative would not reduce the risk of catastrophic wildfire in large areas with excessive amounts of brush, unthinned stands of timber and stands of dead trees. Intense wildfires could remove all or most riparian and upland vegetation, which could contribute large amounts of sediment to stream systems, increase water yields, remove shading vegetation, and damage riparian function (Campbell and Morris 1988, Helvey 1972 as cited by Gresswell 1999). The effects of high severity wildfires on runoff and erosion are generally much more severe than the effects of prescribed fires (Robichaud et al. 2010). Furthermore, increased water yields and sediment delivery from wildfire could cause channel and

streambank erosion. Increased stream temperature and sediment could adversely affect aquatic species should a large wildfire occur.

No action would maintain the habitat conditions that currently exist for fish and other aquatic species. The habitat of the Snow Creek and Whychus Creek would continue to provide good growing conditions for redband trout and future steelhead populations. Instream habitat would continue to develop in complexity from dense stands of ponderosa pine, Engelmann spruce, mountain hemlock, lodgepole pine and white fir. Certain roads in riparian area would continue to deliver low levels of fine sediment after heavy rains or rain on snow events. Amounts of sediment entering streams in runoff is predicted to be low because of the low density of ephemeral and intermittent channel that carry runoff all the way to fish bearing streams, primarily due to the high soil permeability and high infiltration rates.

The risk to long term shade, instream wood, streambank stability, and fine sediment loading increases with the increased risk of intense large scale wildfire. Without fuel treatments, the risk of stand replacement wildfire increases. The lack of upland treatments leaves the riparian areas at greater risk. Any increases in fine sediment from tributaries within a large intense wildfire may be stored in the bed of lower gradient or spring-fed reaches and may recover more slowly than higher gradient or snowmelt driven reaches with flashy flow regimes.

There are no 303(d) listed streams within the project area or in close enough proximity that they could be influenced by no action in the project area. As previously mentioned, the no action Alternative would not reduce the risk of catastrophic wildfire in large areas with excessive amounts of brush, unthinned stands of timber and stands of dead trees. Consequently, catastrophic wildfire could reduce and eliminate riparian and upland vegetation, and result in degradation to watershed health (increased turbidity/sedimentation and temperature, and possibly decreased dissolved oxygen levels in streams. Without active restoration of upland forests and riparian reserves the risk of a large high intensity wildfire would continue to exist along streams in the project area. There would be no direct impacts to water temperatures or 303 (d) streams under Alternative 1.

The Whychus Creek Wild and Scenic area is located adjacent to the project area on Snow Creek and Whychus Creek. Fisheries and hydrology are both Outstandingly Remarkable Values (ORVs) for the Wild and Scenic Area. There would be no direct effect on the ORVs of the Whychus Creek Wild and Scenic Corridor under the No Action Alternative. Fisheries and fish habitat would be protected through current management of the corridor that protects large wood and riparian streambank conditions.

### *Effects of Action Alternatives 2 and 3*

All action alternatives will be analyzed for effects in one analysis because no treatments are proposed in Riparian Reserves (RRs). Treatments such as mistletoe treatments, thinning with group openings and temporary roads are eliminated in alternatives 3, All analysis of upland treatments will tier to alternative 2 (Table 7). Alternative 2 has slightly more treatment acres (See Proposed Action for description of alternatives).

Bull trout, Bull Trout Critical habitat, redband trout and steelhead in the Whychus Creek Watershed will not be affected by the project because the majority of the project drains to Three Creek which is closed system and only has non-native fish. There is only a small portion of the project within the Whychus Watershed and there is no surface flow connection to Whychus Creek which is over two miles away. Impacts or effects to native fish species would not occur.

Forest management practices can potentially affect salmonid habitat. The following is a review of the potential effects from these types of management practices and how they are applicable to this project: Large woody debris in streams is a fundamental building block for creating and maintaining trout and

salmon habitat in forested areas. Physical processes associated with debris in streams includes the formation of pools (important to both juvenile and adult salmonids) and other important rearing areas, control of sediment and organic matter storage, and modification of water quality. Biological properties of debris-created structures can include blockages to fish migration, protection from predators and high streamflow, and maintenance of organic matter processing sites within the benthic community (Bisson et al. 1987). Changes in the distribution and abundance of large woody debris in streams have resulted from timber harvest (Hicks et al. 1991). Timber harvest has reduced the amount and size of large woody debris compared to that in unharvested areas (Ralph *et al.* 1994). In the Melvin Butte Vegetation Management Project no large trees will be removed that could reach the stream and no instream wood will be removed and no effects are expected to current or future instream wood amounts.

The relative magnitude of forest practices on sediment delivery depends on factors such as soil type, topography, climate, vegetation, the aerial extent of the disturbance, the proximity of forestry activities to the stream channel, and the integrity of the riparian zone (Spence *et al.* 1996). Poor road location, construction, and maintenance, as well as inadequate culverts result in forest roads contributing more sediment to nearby streams than any other forest activities. Site disturbance and road construction can increase sediment delivered to streams through road stream interactions and surface erosion (Spence *et al.* 1996). This can elevate the level of fine sediments in spawning gravels and fill substrate interstices that provide habitat for aquatic invertebrates. Salmonid egg survival in both finer and coarser sediment types was found to be inversely related to the percentage of sediments within the incubation gravel with smaller sediments (<0.84mm) being the most detrimental to incubating eggs (Rieser and White 1988). Increases in fine sediments as a result of roads used for the Melvin Butte Vegetation Management Project is not expected as no new roads will be constructed in the RRs, haul will only occur during the dry season, Intermittent stream crossing will only be used when dry and no temporary roads will be used in the RRs.

The removal of riparian canopy reduces shading and increases the amount of solar radiation reaching the streams. The result is higher maximum stream temperatures and increased daily stream temperature fluctuations (Beschta et al. 1987). Even small increases in temperature (1-2 ºC) can result in shifts in the timing of life history events such as spawning and incubation. The cumulative effects of stream temperature changes downstream of logged areas are not well documented. Increases in stream temperature are not expected as a result of the Melvin Butte Vegetation Management Project as no cut buffers will be used to protect waterbodies, all larger shade producing trees will be maintained in Riparian Reserves. Prescribed fires are not planned in the Riparian Reserve and they will be of low intensity which will not lead to significant mortality in the canopy.

# Biological Evaluation

## Indian Ford Juga - USFS Region 6 Sensitive Species

The Indian Ford Juga is only known to exist in Indian Ford Creek (Frest & Johannes 1995). There is no surface water connection between the project area and Indian Ford Creek, therefore no impacts to Indian Ford Juga individuals or their habitat is expected to occur.

## A Caddisfly - USFS Region 6 Sensitive Species

A caddisfly is thought to be a rare species that is very patchily distributed, and apparently highly localized where it does occur (Wisseman pers. comm. in USDA and USDI 2005). Its range is thought to be in the Cascade Mountains of Oregon and California. It is associated with very cold, larger spring-fed streams (Wisseman pers. Comm. in USDA and USDI 2005). There are no very cold large spring fed streams within the project area or within close enough proximity of the project where this species could be effected, therefore no impacts to A caddisfly individuals or their habitat is expected to occur.

## Redband Trout - USFS Region 6 Sensitive Species

## Existing Condition

Three Creek is the main perennial stream within the project area and it is a closed system that was historically fishless. Today Three Creek contains naturally reproducing brook trout and stocked rainbow trout that find their way out of Three Creek Lake.

Outside the project area redband trout are found in Snow Creek up to River Mile 1.6 where a barrier falls exists. Steelhead or chinook were not historically documented in Snow Creek but it is potential habitat. Steelhead and chinook fry have been in released in Whychus Creek.

### *No Action*

There are no expected changes to a redband trout or their habitat from current conditions and they are not expected to be present except in perennial spring creek habitats. No in-stream work will be done and no individuals will be disturbed or harmed. No effects to water quality and streamflow flow would occur and habitats would remain unchanged for this species. Redband trout do not exist in the project area and the area waterbodies in the project area were historically fishless.

### *All Action Alternatives*

### *Direct Effects*

No direct effect will occur because no in-channel work or work in Riparian Reserves will occur in areas known to contain redband trout or potential steelhead habitat. There is the potential for steelhead and chinook to someday utilize Whychus Creek and lower Snow Creek. There is also currently a natural fish barrier below the project on Whychus Creek at river mile 27.4 formed by a debris jam that has trapped bedload behind it and created a 12 ft. high waterfall (Photos on file 2011 Sisters R.D.). However this barrier has not always existed and could be washed out during a large flood event, which frequently occur on Whychus Creek.

Effects to instream flow or overland flows that could increase fine sediments are not expected because compaction and soil disturbances will not occur in Riparian Reserves. Overland flow from upland treatments which mostly consist of understory thinning is not expected as a majority of the forest canopy and down wood will remain.

Litschert and MacDonald (2009) found that timber harvest alone rarely initiated large amounts of runoff and surface erosion, particularly when newer harvest practices were utilized. Sediment delivery from timber harvest will be further reduced by locating skid trails away from streams, maintaining high surface roughness downslope of water bars, and promptly decommissioning skid trails following harvest. The Melvin Butte Vegetation Management Project will utilize newer harvest practices, locate skid trails away from streams, maintain surface roughness downslope of waterbars and decommission skid trails following harvest. Roads within the project area used for harvest and haul activities are not expected to add measurable amounts of fine sediments to fish bearing streams by adhering to the following PDCs and mitigations: Vegetated buffers will be in place between roads and streams in most areas, no new temporary roads will be constructed in Riparian Reserves, stream fords on roads will not be crossed when water is flowing, log haul will occur during dry or frozen periods, landings will not be allowed in RRs, except in some already compacted areas near Three Creek, temporary roads will be obliterated and

subsoiled (if needed) following harvest and drainage features and road maintenance will occur previous to use and when roads are obliterated following the project.

Buffers on all perennial intermittent and ephemeral streams in areas where ground disturbing activities take place will greatly reduce or eliminate fine sediment delivery to streams following falling, skidding and yarding activities. An assessment of surface erosion and sediment routing in Washington State by Rashin et al. (2006) done during the first two years following harvest indicated that a 10 m (33 ft.) setback for ground disturbance can be expected to prevent sediment delivery to streams from about 95 percent of harvest-related erosion features. A six year study by De Groot et al. (2007) in B.C. found that after carefully logging 27 % of the headwaters in a watershed no changes in fish numbers, fish condition or instream habitat were observed. In this study all riparian canopy trees were removed while leaving shrubs, keeping equipment 5 m (16 ft.) away from streams and falling trees away from streams. Habitat variables sampled by De Groot et al. (2007) in four streams following removal of the forest canopy included pool depth, fine sediment, channel exposure, undercut banks and bankfull width.

Mowing would not occur in the Riparian Reserves and effects from mowing in the uplands would be minimal because the equipment would be low impact and the ground would be mostly buffered because the equipment would drive over the brush (Sussmann 1995). Mowing would be restricted to areas outside the Riparian Reserve.

Burning will maintain current streamflow amounts and patterns as burns would be of primarily low intensity and would occur outside the Riparian Reserves(see Fuels report).

Robichaud (2000) found that initial infiltration rates in the areas burned at low severity fell within the upper end of the range from the areas left unburned and undisturbed. Several studies have documented the absence of any change in water yield when low severity burns are conducted that consume little of the duff and kill only a small portion of the live trees (Gottfried and DeBano 1990, Douglass and Van Lear 1983, Heard 2005). Experimental studies that looked at prescribed fire influences on riparian vegetation found no changes in composition of species in plots that were burned when compared to unburned plots (Bêche et al. 2005, Elliott et al. 1999). Another study that sampled a prescribed burn area found no detectable changes in periphyton, macroinvertebrates, amphibians, fish, and riparian and stream habitats compared to data collected over the same time period in four unburned reference streams (Arkle and Pilliod 2010). Prescribed fires at low intensity often do not have the same detrimental effects as wildfires. In Washington dry mixed conifer stands that were thinned and then prescribed burned had 73 % large tree survival following a wildfire compared to stands that were not treated which only had 29 % large tree survival (Pritchard et al. 2010).

Shade and instream wood will remain intact as larger trees and snags will be maintained with only the smaller trees (<12") thinned in plantations and other limited areas in the Riparian Reserves. The large tree shade and instream wood providing component along all perennial streams will remain intact by retaining buffers along all streams. Groom et al. (2011) found that Oregon state forest practices maintained existing stream temperatures with a 52 m (171ft) buffer for clearcuts, which allowed limited harvest (thinning) within 30 m (98 ft.) and a no cut zone within 8 m (26 ft.) of fish bearing streams. These buffer distances are less than what the NWFP requires and what will be used along the majority of stream miles in the Melvin Butte Vegetation Management Project area.

In prescribed burn areas buffers will be used to protect waterbodies and fires will be of low enough intensity that mortality of larger trees is not expected. No instream wood will be removed from streams and downed wood and riparian vegetation will be actively protected from being consumed during prescribed burns. No detrimental direct effects are expected as a result of the Melvin Butte Vegetation Management Project mainly because no treatment will occur in or near native fish bearing streams and

protective buffers and mitigation measures will be used to eliminate detrimental effects to waterbodies and wetlands in the project area.

### *Indirect effects*

There will be no indirect effects to redband trout or potential steelhead habitat in Whychus Creek or Snow Creek. The project will not change stream temperature, instream wood, or sediment delivered to these streams. Since no measurable change in stream shade, sediment or instream wood will result from the project, there are no direct effects to redband trout steelhead or potential steelhead habitat. One study that sampled a prescribed burn area found no detectable changes in periphyton, macroinvertebrates, amphibians, fish, and riparian and stream habitats compared to data collected over the same time period in four unburned reference streams (Arkle and Pilliod 2010). Beche et al. (2005) found no prescribed fire effects on instream wood and V* (residual volume of a pool comprised of fine sediment), but did observe short-term effects on the concentrations of four ions and periphyton biomass. Beche et al. (2005) also observed an immediate (10–19 day) effect on macroinvertebrate community composition, but no effects on benthic macroinvertebrates thereafter. These effects would not be long lasting enough to affect fish food supply and most likely not have any impact on macroinvertebrates.

There will be no change to current composition and amounts of algae or macroinvertebrates in streams or waterbodies from this project. No detrimental indirect effects that could result in effects to native fish are expected as a result of the Melvin Butte Vegetation Management Project mainly because no treatment will occur in or near native fish bearing streams and protective buffers and mitigation measures will be used to eliminate effects in all Riparian Reserves.

### *Cumulative Effects*

The cumulative effects analysis area includes all subwatersheds that streams in the project area drain into and the subwatersheds of tributaries that connect to these drainages via surface flow. The Melvin Butte Vegetation Management Project analysis area includes the subwatersheds associated with Whychus Creek but does not include subwatersheds associated with Trout Creek or Indian Ford Creek, both of which are tributaries to Whychus Creek. These subwatersheds were excluded because they only have a very ephemeral connection to Whychus Creek and are approximately 9 miles downstream of the project area. The Melvin Butte Vegetation Management Project analysis area also includes subwatersheds associated with the Three Creeks drainage. Other subwatersheds in the Deep Creek watershed are excluded because there is very little surface flow and these channels do not connect to any streams that drain out of the project area. The Melvin Butte fisheries analysis area includes portions of the following subwatersheds: Upper Whychus Creek, Middle Whychus Creek, Three Creek, Deep Canyon subwatersheds (See Hydrology Report for subwatershed acres).

No cumulative effects are expected that would detrimentally affect redband trout, potential steelhead habitat or EFH because no direct or indirect effects are resulting from the project. Past management actions in the project area and watershed may have had detrimental effects and many of those have recovered due to natural and planted revegetation growth over time. Some already existing roads or trails may contribute some sediment to streams but this amount is estimated to be very low. No major culvert or road issues were noted as contributing fine sediments to streams during the field reconnaissance for the Melvin Butte Vegetation Management Project which covered the majority of know areas with road and stream interactions. The project will not cumulatively add to increases in flow, sediment or stream temperature or subtract from current and future instream wood at levels that would have adverse effects on fish habitat.

### *Mitigation*

The PDCs and mitigation measures listed in this document and the Melvin Butte Vegetation Management Project EA are needed and will be adhered to in order to protect the viability of aquatic species in Three Creek or other waterbodies within the project area.

### *Determination*

There will be **No Impact (NI)** to redband trout populations. The project will meet NWFP Standards and Guidelines, and/or all Project Design Criteria and minimization measures found in this document and the Melvin Butte Vegetation Management Project EA.

## Biological Assesment

## Bull Trout and bull trout critical habitat - USFWS threatened species

### *Existing Condition*

The nearest documented bull trout populations and critical habitat are located in Whychus Creek over 27 miles away from the project. There is no surface flow connection between the subwatersheds in the project area to lower Whychus Creek where bull trout exist. Bull trout in Whychus Creek are part of the Metolius River/ Lake Billy Chinook Population. This population is considered on the healthiest in the state and in 2012 had a spawning population estimated at 1,251 adults (ODFW 2012).

### *No Action*

There are no expected changes to bull trout or critical habitat from current conditions and they are not expected to be present in or near the project area. No in-stream work will be done and no individuals will be disturbed or harmed. No effects to water quality and streamflow would occur and habitats would remain unchanged for this species where they do exist.

### *All Action Alternatives*

### *Direct Effects*

No direct effects to bull trout or critical habitat will occur as no in-channel work or work in Riparian Reserves will occur in areas known to contain bull trout. There will be no direct effects to bull trout from the project because there is no surface connection from stream in the project to those with bull trout and the nearest known bull trout population is over 27 miles away. Effects from the project itself on Riparian Reserves and streams within the project area are expected to be insignificant. Therefore there will be no detrimental effects that could carry downstream to where bull trout and critical habitat are located.

### *Indirect effects*

Indirect effects will not occur to bull trout as they are currently found only in the lower reaches of Whychus Creek, over 27 miles away from where work is expected to occur. Since no measurable or detectable changes in streamflow, shade, sediment or instream wood will result from the project. No impacts to algae or aquatic insect populations are expected to occur where bull trout reside or critical habitat is located. There are no anticipated indirect effects to bull trout or critical habitat.

### *Cumulative Effects*

The cumulative effects analysis area includes all subwatersheds that streams in the project area drain into and the subwatersheds of tributaries that connect to these drainages via surface flow. The Melvin Butte Vegetation Management Project analysis area includes the subwatersheds associated with Whychus Creek but does not include subwatersheds associated with Trout Creek or Indian Ford Creek, both of which are tributaries to Whychus Creek. These subwatersheds were excluded because they only have a very ephemeral connection to Whychus Creek and are approximately 9 miles downstream of the project area. The Melvin Butte Vegetation Management Project analysis area also includes subwatersheds associated with the Three Creeks drainage. Other subwatersheds in the Deep Creek watershed are excluded because there is very little surface flow and these channels do not connect to any streams that drain out of the project area. The Melvin Butte fisheries analysis area includes portions of the following subwatersheds: Upper Whychus Creek, Middle Whychus Creek, Three Creek, Deep Canyon subwatersheds (See Hydrology Report for subwatershed acres).

No cumulative effects are expected to occur to bull trout or critical habitat because no direct or indirect effects will occur as a result of the Melvin Butte Vegetation Management Project. This is mainly due to the far proximity of bull trout and critical habitat which is located over 27 miles from the project.

### *Mitigation*

The PDCs and minimization measures listed in this document and the Melvin Butte Vegetation Management Project EA are needed to protect streams and aquatic resources in the project area. The viability of bull trout critical habitat or bull trout populations will not be affected by the project.

### *Determination*

There will be **No Effect (NE)** to bull trout critical habitat or bull trout populations. The project will meet NWFP Standards and Guidelines, and/or all Project Design Criteria and minimization measures found in this document and the Melvin Butte Vegetation Management Project EA.

## Aquatic Conservation Strategy

An essential piece of the Northwest Forest Plan is the ACS (Aquatic Conservation Strategy) which "was developed to restore and maintain the ecological health of watersheds and aquatic ecosystems contained within them on public lands" (USDA Forest Service and USDI Bureau of Land Management 1994, B-9). Management activities proposed for watersheds must meet the nine ACS objectives as specified in the Northwest Forest Plan (pages C31-C38). Actions that could affect the ACS objectives are: vegetation treatments, haul on roads in hydrologically connected areas, and road closures and decommissioning in hydrologically connected areas. For each alternative no vegetation treatments are proposed in Riparian Reserves, so the ACS objective discussion will not address each alternative separately. Each ACS objective and how the project would maintain these objectives is discussed below (USDA Forest Service and USDI Bureau of Land Management 1994):

**ACS Objective 1: Maintain and restore the distribution, diversity, and complexity of watershed and landscape-scale features to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted.**

The Melvin Butte Project would not alter watershed or landscape scale features that could affect aquatic resources in the Deep Canyon Watershed. Proposed silvicultural treatments are located in areas outside of Riparian Reserves that would not cause landslides, increased overland flow and associated hillslope

erosion, or changes to channel morphology (see Hydrology Report). No new roads or temporary roads would be constructed that could alter watershed and landscape-scale features. Haul would occur on existing roads and Project Design Criteria would be implemented on haul roads in Riparian Reserves to reduce sedimentation effects. Under the Action Alternatives, 7.71 miles of road would be decommissioned and 5.85 miles would be closed under the Action Alternatives. Of these 12.6 miles, 0.1 miles are located in the outer extent of the Riparian Reserve and 6.3 miles parallel or cross hydrologically connected ephemeral channels. Closure and decommissioning of hydrologically connected roads would help restore the distribution, diversity, and complexity of watershed-scale ephemeral draws by allowing them to revegetation and accumulate downed wood. The Whychus Watershed analysis identified road closures and decommissioning as needed actions to help restore the watershed.

Fire behavior modeling indicates that upland treatments would reduce the threat of a wildfire that could cause stand mortality in the Project. Reducing the threat of wildfire and associated fire suppression effects would help maintain landscape-scale features. Hand thinning plantations would help restore this objective by increasing large trees over time. Thinning small trees, mowing, and burning would reduce vegetation competition and the risk of stand replacement wildfire. Large trees are an important ecosystem component that provide both terrestrial and instream wood habitat for riparian species. There has been a loss of the historic large trees in Melvin Butte Project area. Restoring large trees and associated habitats would help restore the distribution, diversity, and complexity of vegetation across the watershed. The Action Alternatives would maintain or slightly restore the distribution, diversity, and complexity of watershed and landscape-scale features.

**ACS Objective 2: Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include flood plains, wetlands, upsweep areas, headwater tributaries, and intact refugia. These network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.**

The Melvin Butte Project would maintain spatial and temporal connectivity within the Deep Canyon Watershed and between adjacent watersheds. Proposed silvicultural treatments are located in areas outside of Riparian Reserves and are not at a magnitude that would cause channel morphological effects or changes to the Riparian Reserve (see Hydrology Report). Fire behavior modeling indicates that upland treatments would reduce the threat of a wildfire that could cause stand mortality in the Project area. Reducing the threat of wildfire and associated fire suppression effects would help maintain vegetation in Riparian Reserves and other drainage network connections. Thinning small trees, mowing, and burning would reduce the threat of stand mortality from a wildfire. Stand mortality could affect cover in travel corridors for terrestrial and aquatic species. In addition it could reduce long-term large wood recruitment which is important for providing refugia in stream corridors. Therefore, vegetation treatments would maintain spatial and temporal connectivity within and between watersheds.

Hauling on existing road surfaces and using PDCs for haul in the Riparian Reserves would maintain spatial and temporal connectivity between watersheds. No temporary roads would be located in the Riparian Reserve and no new roads would be constructed because existing system roads would be used. By using existing roads in the Riparian Reserve of the project area and not crossing any live channels, there would be no effect to stream network connections from hauling.

Closure and decommissioning of hydrologically connected roads (0.1 miles of which are within the outer extent of the Three Creek Riparian Reserve) would help restore spatial connectivity within drainage networks by restricting use and allowing them to revegetation and accumulate downed wood. Connectivity would be restored for riparian-dependent species and aquatic species that use this riparian reserve or intermittent channel because the road in the Riparian Reserve, which may be an obstruction for

some species, would be removed. The Whychus Watershed analysis identified road closures and decommissioning as needed actions to help restore the watershed. The Action Alternatives would maintain or slightly restore the spatial and temporal connectivity within the Deep Canyon Watershed and between adjacent watersheds.

**ACS Objective 3: Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations**.

The physical integrity of the aquatic system would be restored and/or maintained by the Action Alternatives under the Melvin Butte Project. The physical integrity of channels would be maintained by the proposed activities because no management activities would occur within 300 ft. of perennial streams, 150 ft. of intermittent streams, or within or along the banks of ephemeral channels to protect the tree root influence area. Large wood recruitment, which helps maintain the integrity of aquatic systems, would be maintained because no treatments would occur within the potential large wood recruitment area. Because there are no debris slide or landslide prone areas outside of Riparian Reserves within the Project area, the primary wood recruitment areas in the Melvin Butte project area are approximately 100 ft. on each side of a channel (Benda et al. 2002). Haul on system roads in the Riparian Reserve would not affect streamflow, sedimentation, riparian vegetation, or large wood recruitment, all parameters that can affect channel condition (see Hydrology Report). This is because all haul would be on existing roads and Project Design Criteria would be implemented on haul roads in hydrologically connected areas. Closure and decommissioning of hydrologically connected roads (0.1 miles of which are within the outer extent of the Three Creek Riparian Reserve) would help restore the physical integrity of the aquatic system removing roads in ephemeral draws and allowing them to revegetation and accumulate downed wood.

**ACS Objective 4: Maintain and restore water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.**

The two primary measures of water quality effects from the Melvin Butte Project are increases in fine sediment (or turbidty) and a reduction of shade to waterbodies within the project area. The reduction of shade is related to potential increases in water temperature while increased erosion and sedimentation are likely to affect turbidity and total dissolved solids. The transport of nutrients to the streams as a result of sediment delivery can also affect water quality. Nutrients in streams can also change following a fire for a period of time.

Three Creek is currently not on the Oregon 303(d) for water quality exceedences above the State standards and the Action Alternatives would not affect it's status. Neither water temperature or sedimentation would be affected by the Action Alternatives because ground-disturbing and shade disturbing activities would not occur near streams. No harvest activities would occur within Riparian Reserves; therefore, no shade producing vegetation would be removed.

Sedimentation effects are not predicted because ground-disturbing treatments are outside of vegetated riparian buffers that serve to filter any hillslope erosion before entering water ways. Reintroducing fire back into portions of the project area would help maintian this fire adapted ecosystem (See fuels report). The prescribed burn would help reduce fuel loading and reduce risk of future large-scale wildfires. Sedimentation effects from prescribed fire is not expected because consumption of ground fuels with fire would be patchy and of low intensity in most areas. Likewise, hydrophobic soils would not be expected as a result of the low intensity underburn. In addition, no firelines would be constructed within the Riparian Reserve which would limit soil distrubance. Some sedimentation and nutrients are not expected to reach the stream through runoff due to filtering by vegetation and downed woody debris in the Ripaian Reserve..

Activities such as road use and ground disturbance from timber harvest has been assesed for the potential to increase sedimentation and turbidity. The assesment found management activities as a result of the Melvin Butte Project would be indistinguishable from background levels (see Hydrology report). The topography has minimal drainage features and high infiltration rates which minimizes potential overland flows capable of detaching sediment and carrying it directly into stream channels. Also, project design criteria such as preventative road maintenance and restricting haul times on haul roads in hydrologically connected areas, no new road construction, and locating landings outside of Riparian Reserves help prevent sedimentation to streams. In addition, over the long-term, proposed road decommissioning would help restore water quality by reducing sediment input to the stream from roads in the Riparian Reserve and uplands.

Detrimimental effects to riparian, aquatic, and wetland ecosystems are not expected to occur as a result of this project. Water quality would remain within the range that maintains the biological, physical, and chemical integrity of the Deep Canyon Watershed. The reproduction and migration of individuals composing aquatic and riparian communities would not be detrimentally effected by this project.

**ACS Objective 5: Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.**

The proposed actions would maintain the sediment regime and may help restore it. Sedimentation in streams is not expected from harvest, mowing, burning, because these activities would not occur in Riparian Reserves and project BMPs and PDC will be followed. Very little erosion is expected from haul or road decommissioning and closure in the Riparian Reserve because road PDCs would be implemented and riparian buffers would allow sediment generated to be trapped in the vegetated area before reaching the stream. Underburning would occur outside Riparian Reserves and no fireline would be constructed in Riparian Reserves. Haul would occur on existing road surfaces and in areas adjacent to the stream and would be restricted to the dry season. In addition, haul across intermittent stream fords would be restricted to periods when the stream is dry.

Closure and decommissioning of hydrologically connected roads (0.1 miles of which are within the outer extent of the Three Creek Riparian Reserve) would help restore the sediment regime by by reducing overland flow and fine sediment that is transported from the road to the streams by decompacting the road surface, restoring drainage, and/or adding roughness to the road bed.

**ACS Objective 6: Maintain and restore in-stream flows sufficient to create and restore riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration and spatial distribution of peak, high, and low flows must be protected.**

The Action Alternatives would not negatively affect streamflow because no treatments would occur in Riparian Reserves or hydrologically connected ephemeral channels. Harvest of trees outside the Riparian Reserve would not likely have an effect on streamflow because overland flow in the project area does not generally occur from a reduction in evapotranspiration when trees are harvested because infiltration and permeability rates often exceed precipitation rates. In addition, the majority of vegetation treatments are understory removal in over-stocked stands; therefore, thinning would help move the stand toward more historic conditions

Underburning would not affect streamflow because no new fire line would be constructed within Riparian Reserves, ignition would not be planned in Riparian Reserves and burn severity would not be at a level to cause hydrophobic soils (soils which repel water). In addition, mortality of brush and small trees from the

underburn would not alter streamflows because geology and soils are the primary influence of overland flow in the project area and not evapotranspiration.

Potentially the Action Alternatives could help restore the timing, magnitude, duration and spatial distribution of peak or high flows by reducing the acres threatened under the Fire Model in the Riparian Reserve. Closing and decommissioning of roads in hydrologically connected areas such as 0.1 miles in Riparian Reserves and roads that parallel or cross ephemeral channels would reduce overland flow effects caused by compaction and lack of downed wood or vegetation. Fracturing the road surface, installing water bars, and allowing the road to revegetate and maintain down wood would reduce overland flow contribution to stream channels during high flow periods.

**ACS Objective 7: Maintain and restore timing, variability, and duration of flood plain inundation and water table elevation in meadows and wetlands.**

The action alternatives would maintain variability and duration of floodplain inundation and may help restore timing of floodplain inundation. The project would maintain the floodplain inundation regime because it would not negatively affect streamflow. Compaction and/or hydrophobicity would not be significant and it would not occur in areas likely to flow to any streams (see Hydrology report). Underburning would not affect streamflow because no new fire line would be constructed within Riparian Reserves, ignition would not occur in Riparian Reserves and burn severity would not be at a level to cause hydrophobic soils (soils which repel water). In addition, mortality of brush and small trees from underburns would not alter streamflows because geology and soils are the primary influence of overland flow in the project area and not evapotranspiration (see Hydrology report).

A potential benefit to streamflow from the action alternatives include a reduction of acres threatened by wildfire in the Riparian Reserve. Large-scale wildfire in Riparian Reserves can lead to increases in erosive peak flows which could cause channel incision and a reduction of floodplain inundation. Vegetation treatments would reduce the possible severity of a wildfire. Therefore, after vegetation treatments, the threat of a wildfire that could cause stand mortality in the Riparian Reserves would be reduced and may not lead to streamflow changes if a wildfire were to occur.

Road decommissioning and closure would maintain this objective and possibly help restore the variability of floodplain inundation. Decommissioning and closure of roads in Riparian Reserve or hydrologically connected areas would not affect the timing or duration of floodplain inundation or wetland and meadow water tables because the flow regime would not significantly change. However, decompacting the road surface by subsoiling or natural revegetation of the road surface would help prevent floodwaters from being concentrated on the floodplain and causing erosion; thus, helping restore floodplain variability.

**ACS Objective 8: Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distribution of coarse woody debris sufficient to sustain physical complexity and stability.**

The action alternatives would not result in any significant detrimental changes to riparian habitats as buffers are being maintained on all stream channels. There are no planned project activities in Riparian Reserves.

Instream wood recruitment from lodgepole and white fir has been increasing in areas of high tree mortality. Areas dominated by Ponderosa Pine and other species have had normal rates of tree mortality with low amounts of mortalitly in plantations and second growth. Instream wood levels or future

recruitment would not be detrimentally effected by the project as no large trees or snags will be harvested that could reach streams and no wood will be removed from streams.

None of the action alternatives are expected to negatively affect base flow conditions, nor would affect instream flows to an extent that would inhibit riparian, aquatic and wetland habitats. The timing, magnitude, duration, and spatial distribution of flows contributed by storm events and associated overland runoff from areas within the project area would not be affected by active management associated with this project.

The action alternatives would contribute to the restoration of Objective 8 at the project and watershed scale by restoring the composition and structural diversity of riparian vegetation by reducing fuels in the uplands and associated fire threat and decommissioning and closing hydrologically connected roads. Vegetation treatments would promote the maintenance and development of late-successional forest characteristics in second growth stands and old growth stands and road treatments would provide more area for vegetation to grow.

The action alternatives require no cut buffers along all riparian corridors and wetlands that are perennial or intermittent. These buffers encompass diverse plant communities, protect current shading levels for thermal regulation, protect stream banks from operational disturbances and ensure that soil disturbance does not get routed to waterbodies or wetlands. Designated no cut buffers along units in the planning area, would also protect channel migration processes. The proposed road decommissioning would initiate restoration in the uplands and to lesser extent in riparian corridors. The proposed thinning treatments are designed to accelerate the development of late-successional characteristics and to provide heterogeneity in the landscape by the retention of larger and healthier trees in a gappy, patchy, clumpy manner. The prescription provides retention of larger diameter trees such as ponderosa pine and mountain hemlock.

**ACS Objective 9: Maintain and restore habitat to support well-distributed populations of native plant, invertebrate and vertebrate riparian-dependent species.**

The action alternatives have been designed to restore and enhance habitat conditions for species associated with late and old structure forests. The modeling of fire behavior has been used to show how silvicultural and fuels activities would reduce the potential risk of large scale loss of forest vegetation.

This project contributes to maintaining this ACS objective through restoring habitat for riparian-dependent species by not treating areas within Riparian Reserves. Closing and decommissioning some existing roads in riparian areas and uplands will help to achieve this also. The closure of these roads would create areas free of motorized disturbance to wildlife species as they travel within the riparian corridor. The road decommissioning would not prevent the attainment of this objective and may in the long-term help restore habitat to support native species by removing vehicle use and associated disturbance within the Riparian Reserve. Native amphibians and aquatic invertebrates associated with the stream would benefit from restored natural runoff and sediment inputs.

There is no timber harvest proposed within the riparian zones in any of the action alternatives that would eliminate or retard the development of habitat to support well distributed populations of any native, invertebrate or vertebrate riparian dependent species. Requiring no-cut buffers along all waterbodies, restricting haul to existing road surfaces, and not allowing temporary roads in Riparian Reserves would protect riparian areas from disturbance and help maintain the existing riparian conditions. The no-cut buffers along riparian areas would help maintain the existing microclimates which are especially important for species that are extremely sensitive to changes in temperature and humidity, such as amphibians and certain types of vegetation, as well as for those animals that use the riparian areas as travel corridors. These riparian areas contribute to the landscape heterogeneity of both untreated and treated stands. The retention of riparian plant species and live and dead trees provides for different

stocking levels and species composition. This variety of stand conditions would create a diverse range of habitats that would continue to support a variety of species within the riparian areas and across the landscape.

The proposed action provides for the development of habitat conditions within the riparian areas and across the landscape to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species at the project and watershed scales. This is primarily due to the fact that no project activities except for a small amount of road decommissioning will occur in Riparian Reserves.

### Statement of Consistency with ACS Objectives

Overall, the action alternatives would help restore riparian vegetation and aquatic conditions within the Deep Canyon fifth field watershed by promoting the development of late-successional forest characteristics in second growth and old growth stands outside of Riparian Reserves and by decommissioning and closing roads in Riparian Reserves and uplands. Fire would be reintroduced to areas that were historically maintained by fire. Because terrestrial vegetation and aquatic components and processes are so tightly inter-connected, meeting the desired future condition for these land allocations would also contribute to abundant, well dispersed, high quality habitat for riparian-dependent species.

The action alternatives would also help restore the natural sediment regime by decommissioning roads in Riparian Reserves and uplands which would restore the natural drainage pattern. Designating no-cut buffers along all waterbodies restricting haul to existing road surfaces; and implementing Best Management Practices and PDCs would protect riparian areas and maintain the existing vegetation, connectivity, water flow, water quality, and habitat within the Deep Canyon Watershed.

The action alternatives would include some activities that could result in minimal short term increases in sediment production at individual sites. For example, haul on existing roads in Riparian Reserves has the potential to create short term (a couple of hours to a couple of days) sediment movement in small amounts that would mostly be filtered out by Riparian Reserve buffers before reaching stream channels. However, any negative water quality impacts that could occur from the Melvin Butte Project are anticipated to be small, short-term, and localized. Any short-term increases in sediment production or turbidity are expected to be well within the range of what would typically occur during high winter flows or as a result of typical storm runoff. At the watershed scale, changes in water quality, turbidity or sediment production would not be detectable.

In summary, the activities described above are consistent with the ACS objectives. The proposed road closures and decommissioning's are consistent with the findings of the Whychus Watershed Analysis in that it would maintain stream function and a connectivity corridor for wildlife species. The Melvin Butte Project would maintain watershed and landscape scale features such as natural stream bankfull width and normal floodplain inundation. The proposed project contributes to ACS objectives by helping maintain and/or restore landscape diversity, connectivity, streambank integrity, water quality, the natural sediment regime, floodplain variability, plant communities, and habitat in the Deep Canyon Watershed. The physical integrity of nearby aquatic systems and water quality are likely to be maintained by the proposed activities. Based on the evaluation of the short-term, long-term, and cumulative impacts, the Melvin Butte Vegetation Management Project is designed to "contribute to maintaining or restoring the fifth-field watershed over the long-term." Therefore, the Melvin Butte Project is consistent with ASC objectives.

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